Aid, Real Exchange Rate Misalignment and Economic Performance in Sub-Saharan Africa

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Abstract

Generating sustained growth in Sub-Saharan Africa is one of the most pressing challenges in global development. As the region needs foreign assistance to jump start its development, foreign aid becomes crucial. However, aid booms can also lead to exchange rate overvaluation curtailing exports and growth. This paper provides new evidence on the impact of aid and overvaluation on growth and exports using a sample of 83 countries from 1970 to 2004. We find that aid fosters growth (with decreasing returns) but induces overvaluation. Overvaluation reduces growth but the effect is ameliorated by financial development. Finally, we find new evidence on the negative impact of overvaluation on export diversification and sophistication.

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I. Introduction

Generating sustained growth in Sub-Saharan Africa (SSA) is often cited as the most pressing challenge in global development.[1] Given SSA's disappointing growth record, analysts predict that most of its countries will not meet the Millennium Development Goals (MDGs) by 2015. Prompted by this concern, the international development community has been considering a major scaling up of development aid, especially for those relatively well-managed countries that demonstrate ownership of development programs and progress in governance and institutional capacity (World Bank and International Monetary Fund, 2008). Scaled up aid is necessary for these countries to finance their pressing needs and to eventually achieve the MDGs. However, aid-recipient countries would need to spend aid wisely, which would require both economic management institutions and political processes for enforcing transparency and accountability. Donors also have to adopt aid delivery mechanisms that promote ownership, transparency and stakeholders' participation in the development process. These issues have already attracted considerable academic and policy interest.[2]

However, rapid aid surges –like commodity-price booms— could also pose serious challenges for macroeconomic stability, especially if they produce significant disequilibria in the real exchange rate (RER) and induce the well known "Dutch Disease" phenomenon. This is the main concern of this paper, where we ask the following pivotal question: what impact does real exchange rate misalignment, especially overvaluation, have on growth, aid effectiveness, exports, and economic diversification?

As an economy-wide relative price (of traded to non traded goods), the RER acts as a signal for inter-sector resource transfers and factor movements (human capital, labor, and physical capital) and, thus, provides the incentives to economic agents that largely shape economic activity. Since resource relocation is usually a resource and time-consuming process, RER misalignment can be costly, especially when such changes are frequent or substantial, or when they do not correspond to equilibrium adjustments. During relocation resources may remain idle, in the form of unemployment or excess capacity, negatively affecting the living conditions of the population.

The existing literature suggests that maintaining the RER close to its equilibrium level is a necessary condition for sustained growth and that countries that avoided overvaluation have been associated with sustained export-led growth and substantial export diversification (e.g. Elbadawi and Helleiner, 2004). Moreover, not only avoiding

overvaluation is necessary for growth but a mild undervaluation may be good for growth (e.g. Aguirre and Calderón, 2005). Calamitsis et al. (1999) point out the dual role of RER depreciation. On the upside, a depreciation of the RER has a positive effect on growth by increasing capacity utilization and raising the profitability of traded goods sectors which in turn promotes private investment. Moreover, a depreciated currency provides an economy-wide incentive to new potential exportable products that might face high entry barriers under an excessively strong currency. Further, RER depreciation avoids the necessity of selecting beneficiaries for export subsidies (i.e., "picking winners") as it promotes all exporting industries. On downside, RER depreciation raises the cost of imported goods and since a large component of investment goods in developing economies is imported, such depreciation can dampen investment and lower growth.

Recently Rodrik (2007) argued that these empirical findings are, in fact, a reflection of a deeper causal effect: countries that have managed to engineer an RER undervaluation (e.g. China, Republic of Korea, Taiwan, Uganda, and Tanzania) appear to have indirectly resolved (or provided cushion against) deep institutional constraints. First, weak institutions create a wedge between private and social returns. Second, to the extent that traded goods may be more "complex" and entail more transaction-intensive activities, the wedge between private and social returns may be more severe in traded than non-traded economic activities and can lead to static misallocation of resources in favor of the latter and greater dynamic distortions in the former. When the traded-goods sector is more dynamic, as would be expected in many low-income, small economies, an increase in the relative prices of traded to non-traded goods can improve static efficiency and enhance growth in a second-best fashion. Therefore, RER undervaluation can be an alternative approach for alleviating the costs associated with such institutional weaknesses. Another theoretical justification for engineering an RER undervaluation strategy is based on the view that traded goods (particularly new and non-traditional ones) are subject to a variety of market imperfections, such as information externalities (learning and cost-discovery externalities) and coordination externalities. These imperfections keep output and investment in traded sectors at sub-optimal levels. Again, by raising profitability of traded sectors, an RER undervaluation can be an effective strategy for increasing growth in a second-best world.

The above reviewed literature indicates the role of the RER as a growth fundamental and as a key ingredient for any successful export-oriented development strategy for low income countries. Section II asks the key question as

to why this study focuses on SSA and highlights the centrality of the RER in the overall development strategy of SSA. Section III reports estimation results for the determinants of the RER, based on a world sample of 83 countries and annual 1970-2004 data, focusing, among other fundamentals, on the role of aid. This allows us to subsequently derive measures of RER equilibrium and RER misalignment in SSA and analyze the role of fundamentals versus other short-term error-correction factors. Probing further, section IV builds a typology of RER misalignment across groups of African countries and highlights structural and policy characteristics that may explain such behavior. Section V reports estimation results for a growth model based on a world sample of 77 countries and 5-year data spanning 1970-2004. The growth specification allows testing for the influence of foreign aid and RER misalignment on growth, controlling for standard growth determinants and allowing for key interactions between aid, RER misalignment, and financial development. Section V assesses the impact of RER misalignment on manufacturing exports as a share of merchandise exports, a measure of export diversification, as well as a measure of the knowledge-intensity of exports for a panel dataset of over 50 developing countries spanning the period 1993-2004. Section VI contains a summary of the main results.

II. Why are the Real Exchange Rate and External Aid so Critical for Growth in SSA?

The literature suggests that resource misallocation away from export-oriented sectors has been substantial and particularly harmful in SSA.[3] The external sector vital for most African economies since their domestic markets are small, their production base is not well-diversified, and human capital levels and the adoption of technology are low. For such countries, economic growth depends largely on the fate of the exporting sectors which provide the main source of foreign currency, contribute substantially to government finances, attract foreign direct investment and, eventually, lead to productivity gains that are at the heart of sustained growth.

Distorted relative prices arising as a result of exchange rate overvaluation affect human and physical capital accumulation. In turn, this affects exports and growth patterns. In the specific case of SSA, Cottani et al. (1990) find that overvaluation is strongly related to low growth. It is also related to low productivity as capital does not go to the companies or sectors that could make the best use of it. Ghura and Grennes (1993) and Fosu (2000) obtain

econometric evidence that confirms the negative impact of overvaluation on labor productivity for SSA countries, even when controlling for investment rates. The latter is consistent with the notion that not only investment declines as a result of overvaluation but that resources are also poorly allocated. Moreover, the level of the real exchange rate affects competitiveness directly, through the return to investing in traded-goods industries, and indirectly, by affecting the use of comparative advantages. This problem has been documented in the case of Africa by Elbadawi (1998) and Mengistae and Pattillo (2002). Furthermore, not only the level of RER impacts economic growth; fluctuations in the RER can also induce substantial uncertainty to investment decisions and, as a consequence, hamper investment and long-run growth (Caballero and Corbo, 1989). Bigsten et al (2004) provide evidence that exporting activities in Africa increase firm productivity not just because of self-selection effects but also because of learning-by-exporting.

The World Bank (2000) has convincingly argued that in order for Africa to be successful in the 21st century, it needs to move away from its near total dependence on traditional exports and into more diversified, higher value-added exports which can satisfy rapidly growing demand and accommodate the rising population of urban areas. Given that SSA comprises primarily small and medium size low-income countries, where opportunities for significant TFP growth are limited in the short-run, the real exchange rate has been identified by some analysts as crucial for export-oriented development strategies. Williamson (1997) argues that, to overcome the initially limited capability for exporting manufactures and other non-traditional products and to give exporters a competitive edge in the international market, the real exchange rate may have to depreciate quite considerably, overshooting its eventual equilibrium value so as to make the non-traditional export sector an appealing destination for investment. Elbadawi and Helleiner (2004) argue that excessive dependence on volatile aid in most African countries has led to the premature strengthening of currencies thus, undermining export capacity. They conclude that only after the economy is sufficiently modernized and has achieved high TFP levels can an export-promotion strategy afford not to be driven by RER undervaluation, though the RER should still be kept close to equilibrium.

Compared to other developing regions, real exchange rate adjustment in the last decades in Africa has been markedly different. In the aftermath of the 1982 debt crisis many developing countries outside SSA undertook a deep and relatively swift RER depreciation, consistent with reversed or declining capital inflows, falling aid flows and worsening terms of trade. The latter events also took place in SSA, but RER adjustment did not take place or took

much longer to happen and, evidently, was also more costly in terms of economic performance. While the median RER in developing countries depreciated by 30% in just six years (1982-88), it took the median African country about 11 years to achieve the same rate of depreciation (see Figure 1). Within SSA, adjustment differed across exchange rate regimes: countries with prevalently flexible exchange rate regimes saw their real exchange rate steadily depreciate throughout the 1980s and early 1990s, while countries with fixed exchange rate regimes maintained a steady level of the RER until the mid 1990s, when swift adjustment was undertaken (see Figure 2).[4]

FIGURES 1 and 2 HERE

Other patterns of adjustment are revealed when focusing on the fact that SSA economies rely heavily on exporting primary resources. Previous research shows that in most SSA economies more than half of exports consisted of just two primary commodities (Clarke, 2005). SSA countries that are typical primary-commodity exporters were characterized by higher levels of the RER in the 1980s when compared to non-primary exporters. By the mid 1990s all economies had adjusted to similar levels of RER, indicating that adjustment was much larger in primary-commodity exporters (Figure 3).

FIGURE 3 HERE

Therefore, for most developing countries outside SSA massive RER overvaluation appears to have been dealt with well before the end of the 1980s. This allowed the median developing country to pursue a much more balanced menu of policies for the two decades, and was, therefore, able to also focus on RER stability while responding to the need for modest equilibrium corrections associated with the more gradual evolutions of the fundamentals. On the other hand, many African countries experienced massive episodes of RER overvaluation well into the mid 1990's.[5] The fact that the median African country had lagged behind on this key aspect of economic reform must be associated with the disappointing export and growth performance of Africa relative to the rest of the developing world. As Figure 4 shows, with the exception of the period 1985-89, SSA has consistently had a smaller share of its exports made up of manufacturing products. Moreover, while the rest of the developing countries have steadily increased their manufacturing export shares to total merchandise exports, SSA has experienced significantly more volatility and is yet to get back to its 1985-89 share. Such volatility has also been mirrored in the substantially higher volatility of median growth of GDP per capita in SSA, as depicted in Figure 5.

FIGURES 4 and 5 HERE

The aid-dependence issue also merits some elaboration. As illustrated by Figure 6, SSA is highly dependent on foreign aid flows. Furthermore, unlike developing countries outside the region, the median SSA country saw aid shares to GDP steadily increase until 1995, and since 2002 aid shares are experiencing a new upward trend possibly due to debt forgiveness and the donor commitment to help African countries reach the MDGs.

FIGURE 6 HERE

We think that the aid feature merits special consideration in the context of an overall development strategy for SSA and, thus, it will be given ample analysis in the following sections. Specifically, although the magnitude of foreign aid in SSA is well known and its effectiveness well researched (see World Bank, 1998), models of the equilibrium RER and have largely failed to control explicitly for foreign aid. Unsustainable amounts of foreign aid, in fact, can lead to a disequilibrium appreciation of the real exchange rate and can thus have harmful consequences for export sectors and overall economic performance. However, this detrimental effect is dependant on the way in which the foreign assistance is managed, typically through the amount of aid chosen to be absorbed (as opposed to kept in international reserves) by the monetary authorities. These considerations, which we address below, are particularly important in SSA where aid flows in the range of 20% of GDP are common.

III. An Empirical Model of the Real Exchange Rate

The most popular methodologies to determine the equilibrium RER are based on a single-equation, reduced-form model that attempts to account for current-account flow variables as well as factors influencing longer-run stock equilibrium.[6] The underlying notion of equilibrium is essentially intertemporal as the path of the equilibrium RER is assumed to be influenced not only by the current value of the fundamentals, but also by anticipations regarding the future evolution of these variables.

Elbadawi and Soto (2008) develop a dynamic, general equilibrium model for a small, three-sector, open economy (with exportable, importable, and non-traded goods) and a representative household that chooses consumption and leisure so as to maximize its welfare. The specification allows for the explicit derivation of portfolio and stock equilibrium variables as determinants of the equilibrium. This model controls for standard RER

fundamentals (terms of trade, productivity differentials, trade openness, and government consumption) as well as other determinants that are not frequently considered by the literature, such as a model-consistent measure of sustainable (or long-run) imports, as well as taxes on traded and non-traded goods.

While Elbadawi and Soto's model provides a consistent analysis of the determinants of the long-run equilibrium RER, it abstracts from medium-term policy issues associated with capital flows and foreign reserve accumulation. Consequently, we modify their model to include foreign aid (net of changes in foreign reserves held by the monetary authority) and net foreign income. A sustainable increase in any of these components would lead to an equilibrium RER appreciation. We specify and estimate an empirical model for the RER that predicts the equilibrium RER to be more appreciated with higher terms of trade (TOT), larger productivity in the traded-goods sector relative to the non-traded sector (PROD), lesser trade openness (OPEN), higher government consumption (GOV), higher taxes on non-traded goods (TAX), larger aid flows (AID), and larger net foreign income (NFI). Therefore, our specification is:

$$\log(RER)_{it} = \beta_{0i} + \beta_1 \log(TOT)_{it} + \beta_2 \log(PROD)_{it} + \beta_3 OPEN_{it} + \beta_4 \log(GOV)_{it} + \beta_5 \log(TAX)_{it} + \beta_6 AID_{it} + \beta_7 NFI_{it} + \varepsilon_{it} \quad (1)$$

where subscripts *i* and *t* represent country and time indexes, respectively, and β_{0i} and ε_{it} are country-specific intercepts and disturbance terms.[7]

We estimate an error-correction version of equation (1) for a world panel comprised by annual data for 83 countries for 1980-2004, including 36 SSA economies. We use three econometric estimation methods appropriate for an error-correction specification of equation (1) applied to panel data. The pooled mean group (PMG) estimator – which imposes the restriction that all countries share the long-run coefficients; the more general mean group (MG) estimator –which assumes that the economies differ in their short and long-run parameters; and the dynamic fixed-effects (DFE) estimator,--which assumes that all parameters are constant across countries, except for the intercept which is allowed to vary across countries. The choice between the three estimators entails a trade-off between consistency and efficiency. The DFE estimator dominates the other two in terms of efficiency if the restrictions of equality of short and long-run parameters are valid. If they are false, however, the DFE will generate inconsistent estimates. The MG estimator imposes no cross-country parameter restrictions and can be estimated on a country-by-

country basis, provided that the time-series dimension of the data is sufficiently large. For our purposes, the PMG offers the best compromise between consistency and efficiency: we expect the long-run path of the RER to be driven by a similar process across countries, while the short-run dynamics around the long-run equilibrium path may differ from one country to another because it is likely to be driven by idiosyncratic news and shocks to the fundamentals.

Table 1 reports the results for the three estimation methods. The restriction of the PMG against the MG model can be tested using Hausman tests. The null hypothesis of equality of coefficients cannot be rejected at the 1% or 5% level for all regressors, while it can be rejected at the 10% level for two out of seven regressors, namely productivity and aid. We, nevertheless, favor the PMG model against the MG and DFE estimators.

TABLE 1 HERE

The results for all fundamentals are consistent with the theoretical and empirical literature.[8] All long-run coefficient estimates are highly significant (at 1% and 5% significance levels), displaying expected signs according to theory. In particular, these results show that higher long-term aid contributes significantly to RER appreciation. Regarding the short-term elasticities, the PMG results suggest that several fundamentals (the terms of trade, relative productivity, and net foreign income) have highly significant short-run effects on the RER. Short-term changes in aid, nevertheless, did not have significant effects on the short-term behavior of the RER. The estimated average adjustment parameter is -0.20, equal to the one obtained by Edwards (1989) using a partial adjustment model for a group of 12 developing countries.

In addition to the statistical significance of our parameters, we are interested in their economic impact, especially when thinking about the effects of alternative policies on the RER. In fact, the implied elasticities need not be of significant economic meaning. For example, according to our estimation, a 10% increase in government consumption (as % of GDP) would lead to an appreciation of 20% of the RER. While these magnitudes are plausible, they are not typically observed in real life. Likewise, a 25% change in terms of trade –which would lead to a 5% change in RER— may appear as an excessively large foreign shock for most observers, yet it occurs frequently in Africa. In 1980-2003, 143 of the 187 episodes of annual fluctuations in terms of trade above 25% occurred in African economies.

We thus measure the implied economic effect of fundamentals on the RER by multiplying the estimated

long-run elasticity by the standard deviation of the variables in the sample. A one standard deviation change in the level of a variable reflects a typical shock for an economy (in fact, if the distribution of the variable is normal it would correspond to 68% of the cases). The results are presented in Table 2 for the regional SSA average.

TABLE 2 HERE

The direct economically plausible effects of net foreign income and aid on the long-term path of the RER are much smaller than the corresponding direct effects for other traditional fundamentals. A one-standard-deviation increase in aid (about 6.7%) leads to 1.3% RER appreciation in the long-run, while a similar shock to net foreign income (at 3%) leads to 1.2 % appreciation. On the other hand, the long-run impact of openness and productivity are much more important. Despite productivity and openness experiencing modest shocks (at standard deviations of 0.4 and 0.2%, respectively), given their high estimated long-run coefficients, the two fundamentals have had substantial (and opposing) long-run effects on the RER. Assuming the above positive shocks, more openness will cause an RER depreciation of 13%, while higher productivity would lead to 21% appreciation.

The main policy implication of these long-run results is that aid has not been, so far, associated with RER appreciation. However, this result could have been driven by the fact that aid was only partially absorbed by aid-dependent countries. Elbadawi and Kaltani (2006) find that countries in SSA have only partially absorbed incremental aid flows quite possibly attempting to strike a balance between its positive development impact and the concern over its likely upward pressure on the RER.

IV. Real Exchange Rate Misalignment: How Serious?

Using the estimation results of Table 1 and the methodology described in Appendix C, we construct indexes for the equilibrium real exchange rate (ERER) and real exchange rate misalignment (MIS). The ERER is obtained by feeding the estimated model with the permanent components of the fundamentals (estimated with the Hodrick-Prescott filter). These permanent components are characterized as sustainable levels and are therefore consistent with the concept of equilibrium. The ERER is normalized (through the country-specific intercept) so that the long-run misalignment for each country is set equal to zero. This imposes the plausible identification condition that no country

can be overvalued (or undervalued) on a sustained basis for the full estimation period. The log of the resulting normalized ERER is then subtracted from the log of the actual RER to obtain the MIS time-series measures for each country. The analysis can be developed using the three pivotal equations from Appendix C:

(2) $$e_t^i = \hat{\beta}' F_t^i + \hat{\varepsilon}_t^i$$

(3) $$\tilde{e}_t^i = \bar{e}^i + \hat{\beta}'(\tilde{F}_t^i - \bar{\tilde{F}}^i)$$

(4) $$MIS_t^i = e_t^i - \tilde{e}_t^i = \hat{\beta}'\left\{(F_t^i - \bar{F}^i) - (\tilde{F}_t^i - \bar{\tilde{F}}^i)\right\} + \left\{(e_t^i - \bar{e}^i) - \hat{\beta}'(F_t^i - \bar{F}^i)\right\}$$

where e_t^i is the log of the real exchange rate for any given country *i* at time *t*; F_t^i and $\tilde{F}_t^i$ are the vector of current and sustainable fundamentals, respectively; β is a vector of long-run coefficients; and a bar over a variable indicates the mean over time. Equation (2) expresses the log of the RER in terms of current fundamentals and a residual term, while equation (3) specifies the log of the equilibrium RER that satisfies the above normalization condition. The equilibrium RER is expressed as the sum of the mean of the observed RER and a term that depends on the difference between the sustainable fundamentals and their mean values ($\hat{\beta}'(\tilde{F}_t^i - \bar{\tilde{F}}^i)$).

Equations (2) and (3) allow us to derive the expression for the misalignment in equation (4), which comprises two components. The first term on the right hand side is the fundamentals effect, which measures the contribution to misalignment due to the divergence between the current fundamentals and their long-term sustainable path. The second right hand side term is the error-correction effect, which accounts for the short-run divergence between the actual RER and the RER path associated with the fundamentals.

IV.1 Misalignment in and outside SSA

The evidence of misalignment over time (1980-2004) suggests that adjustment cycles in developed countries are different from that of developing economies. The real exchange rate in the median developed country remained very close to equilibrium (i.e. misalignment close to zero), while the median developing country experienced much more pronounced cycles (see Panel A of Figure 7). Since 2002, however, overvaluation in developed countries has spiked up, largely reflecting the introduction and subsequent appreciation of the Euro.

Within the developing countries' group there are also important differences: the median African country

tended to experience more extreme cycles of adjustment throughout the 1980s and early 1990s, including the large devaluation of the CFA franc in 1994 (Panel B of Figure 7). Within its own region, SSA has shown a heterogeneous behavior because of the prominent dichotomy between the monetary unions and the countries with more flexible exchange rate regimes, as discussed below.

FIGURE 7 HERE

IV.2 Misalignment by Exchange Rate Regimes

The evidence indicates that SSA countries with fixed exchange rate regimes (pegged to the US dollar, the French franc or the euro) display very different levels of misalignment and dynamics when compared to countries that float their currencies. From 1980 until 1996, the real exchange rate in the median SSA country with a flexible exchange rate remained undervalued or near the equilibrium. After 1996, nevertheless, overvaluation increased to 10% but there was a reversion to equilibrium in 2002. Thus, with a few exceptions, throughout the entire period the RER in countries with flexible exchange rates remained quite competitive (Panel A of Figure 8). This competitiveness becomes more appreciated when these countries are contrasted with currencies in CFA countries which were overvalued until the 50% devaluation in 1994. Despite the devaluation having provided some competitiveness to the CFA countries for the last part of the 1990s, by 2002 the CFA became overvalued again and by 2003 had reached an overvaluation peak not experienced before. On the contrary, the RMA countries have been quite well managed with the RER being mostly undervalued or in equilibrium throughout most of the period. Even an overvaluation that ensued in 2003 seemed to have reverted back to equilibrium by 2004 (Panel B of Figure 8).

FIGURE 8 HERE

This suggests that even within the super-fixed exchange rate regimes (CFA versus RMA) there are very different patterns of adjustment. Moreover, within the CFA, there are non-negligible differences between its two monetary unions, the UMOA and BEAC (Panel B of Figure 8). The overvaluation spell in the second half of the 1980s was much longer for the UMOA than the BEAC, while the subsequent gains from the 1994 devaluation were much more limited for the BEAC compared to UMOA.

IV.3 Main determinants of misalignment

We decompose the average misalignment for each group within and outside Africa to account for the relative contributions of the fundamentals and the other short-run adjustment effects (i.e. nominal exchange rate devaluation, monetary emission, etc.) that determine the error-correction feature of the RER adjustment toward its long-term equilibrium (Table 3). The evidence across three sub-periods (1985-93, 1994-99, and 2000-03) suggests that adjustment to initial misalignment tends to be substantially faster in African countries with flexible exchange rate regimes. This is reflected in the very small average misalignment for these countries, compared to the larger misalignment estimates for the fixed exchange rate regimes. This is consistent with the relative difficulty of adjustment in the latter due to their inability to adjust the nominal exchange rate to accelerate the convergence of the RER toward the equilibrium.

TABLE 3 HERE

The table also makes clear that the error-correction term drives the outcome of adjustment, especially in super-fixed regimes. For example, in the first period the appreciation of the French Franc complicated adjustment in the zone and was, therefore, linked to the large overvaluations during this period in UMOA, though there was no evidence that BEAC was affected.[9] Because of these very different initial conditions, the 1994 devaluation appears to have helped the UMOA by accelerating adjustment towards equilibrium (as reflected by the large negative error correction term: -13 %), while on average the BEAC became overvalued with the error-correction term driving this process. On the other hand, the steady depreciation of the Rand (the anchor currency) since the mid 1980s had a limited impact on the RMA countries until the most recent period. In fact, the recent appreciation of the rand since 2000 has driven the mild overvaluation taking place in the RMA.

IV.4 A Taxonomy of Real Exchange Rate Misalignment in SSA

Although the choice of the nominal exchange rate arrangement is a crucial one and plays an important role in determining misalignment, other country structural and policy features play a role in the adjustment process. The dichotomy between the fixed and flexible exchange rate regimes remains, but there are additional subtleties that distinguish countries within such regimes. Our analysis indicates the existence of three sub-groupings for the fixed

exchange rate countries and, likewise, three sub-grouping for the flexible exchange rate economies.

Group one is made up of countries that have been historically well managed but that have shown some increasing overvaluation in the late 1990s and 2000s (Kenya, Madagascar, Zimbabwe, Swaziland, Sudan, Zambia and Guinea-Bissau). For some countries the recent overvaluation has been largely driven by short-run effects such as a very rapid increase in the money supply (Guinea-Bissau, Sudan, and Madagascar). For the other economies, fundamentals also played a role. They include increasing productivity and declining openness in Kenya, declining openness in Swaziland, and rising terms of trade due to copper prices in the case of Zambia. Short-run macroeconomic policies also led to increasing overvaluation in Zimbabwe.

Group two is made up of countries that saw an adjustment of the RER in the latter part of the 1990s (Rwanda, Lesotho, Malawi, Burundi and Tanzania). These countries had been fairly close to equilibrium but had appreciated in the early 1990s. For Rwanda and Burundi overvaluation came partly by productivity and government policies, but to a great extent by short-run phenomena. In Lesotho the appreciation since 1991 was possibly driven by the evolution of the South African Rand. In Malawi the overvaluation spells in the 1990s have been short lived with rather quick returns to equilibrium, driven by a combination of fundamentals (productivity and government consumption) and short run phenomena. Finally in Tanzania the overvaluation that started in 1996 was driven by fundamentals (productivity and to a smaller extent terms of trade, taxes, and aid) and short run phenomena.

Group three is composed of flexible exchange rate countries that have experienced major adjustments in the mid 1980s (South Africa, Ghana, Mozambique, Uganda, Sierra Leone, Botswana, Mauritius) and mid 1990s (Ethiopia) and that have remained mildly misaligned or close to equilibrium since then.

Group four is composed of countries belonging to the CFA zone (Senegal, Niger, Mali, Benin). For these countries the devaluation of the CFA franc in 1994 was effective in realigning the RER with fundamentals. In fact, they have remained close to equilibrium for over a decade.

Group five is composed of more CFA zone countries (Burkina Faso, Togo and Mauritania which is not a member but is highly influenced by the CFA zone). For Burkina Faso and Togo the 30% real devaluation of 1994 was not needed, and it turned out to be an overkill. The RER was overvalued in Mauritania in 1994. However, the impact on the RER in the subsequent years has been dramatic. In all three countries the RER has been massively

undervalued, driven primarily by short run phenomena that have not been countered even by the appreciating fundamentals.

Group six is composed of large economies also belonging to the CFA zone (Cote d'Ivoire, Central African Republic, Cameroon, Gabon, Chad). These countries experienced rising overvaluation culminating in the year of the devaluation. However, for them the devaluation provided only a short relief for competitiveness as they again show signs of overvaluation. In addition to short run phenomena, the overvaluation has also been driven by productivity issues, terms of trade, and to a smaller extent government consumption, taxes, and net foreign income and aid.

V. Aid, Misalignment, and Economic Performance

V.1 Growth performance

Recent research indicates that, in general, aid does not influence economic growth. However, when aid is delivered to countries that feature a good policy environment, it may increase growth but its effect is subject to diminishing returns (see Burnside and Dollar, 2000). To study the link between RER misalignment and economic growth, we specify and estimate a rich empirical growth model that nests the different strands of the growth literature discussed above: aid, RER misalignment, and financial development, as well as their possible interactions. We control for conventional growth determinants that are robustly identified in the empirical cross-country growth literature. We focus on three issues. First, which are the separate effects of aid, RER misalignment, and financial development on growth? Second, does aid reduce or augment the impact of RER misalignment on growth? Finally, is the growth loss from RER misalignment ameliorated by financial development?

The empirical model follows the modern growth literature and corresponds to:

$$(5)\quad y = \beta_0 A_{it} + \beta_1 A_{it}^2 + \beta_2 MIS_{it} + \beta_3 FD_{it} + \beta_4 A_{it} * MIS_{it} + \beta_5 MIS_{it} * FD_{it} + \beta_6 CV_{it} + \mu_t + \eta_i + \varepsilon_{it}$$

where *y* is per-capita GDP growth; A is aid as a share of GDP, MIS is misalignment, *FD* is a measure of financial development, *CV* is a set of standard control variables that are robustly associated with cross-country growth (initial per capita GDP, initial GDP cyclical component, inflation, government expenditure as a share of GDP, human capital investment, a rule of law index, and a measure of trade openness); and μ_t and η_i are time and country fixed-effects, respectively.

Our estimation technique addresses issues of endogeneity and unobserved country characteristics. Aid is measured at the beginning of each period because the overwhelming evidence suggests that recipient countries tend to absorb aid with some time lag. Beginning of period aid is also likely to be exogenous because aid is partially responsive to recipient countries' past economic performance, including past growth. However, policy fundamentals are likely to be jointly determined with growth as well as responsive to future anticipated performance. Therefore, to account for endogeneity and country-specific unobserved characteristics, we use the system Generalized Method of Moments (S-GMM) dynamic panel estimation method. We apply it to a panel of 77 countries, comprised by developing economies as well as industrial countries, for 5-year non-overlapping averages spanning the period 1970 until 2004.

The S-GMM developed in Arellano and Bover (1995) and Blundell and Bond (1997) uses lagged values of the dependent and independent variables as instruments and combines regressions in differences with the regressions in levels to avoid weak instrumentation. The consistency of the S-GMM estimator is assessed by two specification tests. The Sargan test of overidentifying restrictions tests the overall validity of the instruments. Failure to reject the null hypothesis gives support to the model. The second test examines the null hypothesis that the error term is not serially correlated. Again, failure to reject the null hypothesis gives support to the model.[10]

The first column of Table 4 reports the results of estimating equation (5) without the interaction terms; the second column reports the results when we include the interaction of aid with misalignment, and column 3 reports the complete regression where financial development is interacted with misalignment. The regression results show that the standard growth fundamentals have the expected sign and are statistically significant.[11] Moreover, both the Sargan and the serial-correlation tests validate our specification.

TABLE 4 HERE

The fully specified model (column 3) indicates that aid, RER misalignment, and financial development have both direct and non-linear effects on growth. In fact, the results show that aid is positively but non-monotonically associated with growth. Misalignment has a negative effect on growth. Furthermore, the interaction between misalignment and aid has a negative and significant effect on growth. These results corroborate two key findings about aid effectiveness. First, aid is more effective in a good policy environment, which in our case implies avoiding overvaluation. Second, aid effectiveness is subject to diminishing returns. Finally, the significance of the coefficient of

the interaction between misalignment and financial development supports the view that financial development ameliorates the negative repercussions of overvaluation.

The above findings make it possible to study the total effect of a change in RER overvaluation on growth. From equation (5), note that the overall growth effect of a change in RER misalignment is given by the following expression:

$$\Delta y_{it} = (\beta_2 + \beta_4 A_{it} + \beta_5 FD_{it})\Delta RERMIS_{it} \quad (6)$$

where β_2 is the direct effect of RER misalignment on growth, and β_4 *A* and β_5 *FD* are the non-linear effects of misalignment on growth that depend on the levels of aid and financial development. The estimated parameters suggest that the direct effect of a standard deviation change in misalignment (about 21% for the entire sample) would amount to about a 1.1 % loss in economic growth. In addition, if aid and financial development were held at their median values, the indirect effects of misalignment would amount to a loss of 0.04% when accounting for the interaction with aid (this is due to the fact that median aid for the entire sample is quite small) and a gain of nearly 1% when accounting for the interaction with financial development.

Nevertheless, many developing countries are highly dependent on aid and have rather shallow financial markets. In order to reflect such reality and obtain more realistic scenarios, we perform two exercises. First, we investigate the effects of RER misalignments on growth under different levels of aid dependency while holding financial development constant at the median value. Second we simulate the growth impact of a one standard deviation change in RER misalignment under different levels of financial development while holding aid constant at the median value.

In the first exercise, we study the impact of RER misalignment shocks on growth under various levels of aid. The shock amounts to about 25% and corresponds to the standard deviation of misalignment observed in SSA in the sample period. We assume three levels of aid: (a) "low levels" is the median aid value (as a share of GDP) for recipient countries for the entire sample in the most recent period in the regression, 2000-04; (b) "medium levels" correspond to the median aid flows of SSA in the same period, and (c) "high levels" correspond to the highest aid value that SSA has received in the recent period. The financial development measure in this exercise is held constant at SSA's median value and it amounts to nearly 25% of GDP. Figure 9 depicts the impact of such scenarios on economic growth. As

evidenced by the figure, the level of aid plays an important role in the ability of misalignment to affect growth. A one-standard-deviation change in misalignment would lower growth by 0.4% under a low-aid scenario, 0.8% under a medium-aid scenario, and by 1.8% under a high-aid scenario.

Figure 9 also shows the second exercise, i.e., the growth impact of the same change in misalignment but under various levels of financial development while holding aid at its median value in 2000-04 for SSA. As mentioned, financial markets in SSA are quite shallow: the median share of liquid liabilities to GDP was nearly 25% for SSA while the median value for developing countries amounted to 39%. We assume three levels of financial development: (a) "low levels" is the 25th percentile of liquid liabilities (as a share of GDP) for SSA countries in the most recent period in the regression, 2000-04 ; (b) "medium levels" correspond to the median liquid liabilities of SSA in the same period, and (c) "high levels" correspond to the 75th percentile of liquid liabilities for the entire sample in the recent period. The simulation results show that the level of financial development mitigates some of the detrimental effects of overvaluation. Under the low level of financial development, a one standard deviation change in misalignment would lower growth by 0.8 percentage points; if SSA's financial development were at the median level of SSA, the loss in growth would amount to 0.7%, and if financial development were to improve to the 75th percentile of the sample countries in the period 2000-04, the loss in growth would be about 0.4%. It is important to note, however, that that there are many countries in SSA whose financial development was as good as or better than the all sample median suggesting that this detrimental effect may be highly heterogeneous.

FIGURE 9 HERE

The simulations presented here can be useful in throwing light on the mechanisms at play in the growth model that we have estimated. Clearly SSA countries need substantial donor support in order to address binding growth bottlenecks and to reach the MDGs by 2015. Our findings indicate that aid would contribute to such goals since aid is found to positively affect growth. The other message that comes out of our analysis is that SSA needs to avoid RER overvaluation which would not only directly undermine its growth performance but would also hinder some of the beneficial effects of aid. Finally, improvements in the financial sector can mitigate some of the negative effects of misalignment on economic growth, and given numerous SSA countries' shallow financial markets, emphasis on this sector would not only have direct beneficial effects on the economy but would also provide the added

protection from the harmful effects of overvaluation.

V.2 Export Performance

Export-orientation has been credited as a successful development strategy leading to economic transformation. Furthermore, sustained export-oriented policies have been associated with significant export diversification, as countries initially limited to exploiting their endowments in natural resources have sought to avoid abrupt sector-specific shocks by moving into the production of non-traditional exports, such as manufacturing.[12]

The empirical literature uses a variety of measures to capture export diversification. Elbadawi (2002) uses the residual of exports after the ten largest three-digit commodity groups have been accounted for. Imbs and Wacziarg (2003) capture concentration (the inverse of diversification) through the use of a Herfindahl-Hirschman index (HHI), coefficients of variation of sector shares, and maximum-minimum spreads. Lederman and Maloney (2006) use the HHI and the share of natural resources in total exports. Hausmann et al. (2006) develop an index that ranks traded goods in terms of their implied productivity (weighted average of the per-capita GDPs of the countries exporting a product, where the weights reflect the revealed comparative advantage of each country in that product), labeled EXPY. The higher this index is, the higher the content of "rich country products" in exports. Everything else constant, their conjecture is that countries that specialize in the types of goods that rich countries export are likely to grow faster than countries that specialize in other goods.

Judging from various measures (Figure 10), SSA is the region with the lowest level of export diversification. In fact, it has the lowest share of manufacturing exports, the lowest EXPY and the highest HHI for export concentration, even lower than the MENA region whose exports are heavily skewed toward primary commodities. Therefore, studying what fosters or hinders export diversification is crucial for a region like SSA. Moreover, the ability to study the determinants of various diversification measures that go beyond manufacturing as a share of exports allows us to capture the stories of various African countries (such as Kenya or Uganda) that have made substantial strides in diversifying their production and export structures by moving not into manufacturing but into high-value agricultural products (Chandra et al, 2007). Unlike the manufacturing shares, the HHI and EXPY measures would allow us to capture such successful diversifications.

FIGURE 10 HERE

Previous literature studying the determinants of export diversification has focused on countries' factors of production (i.e. population, land per worker, natural resources) and/or geographic factors. Here we account for such factors but we focus on the role of the real exchange rate. As discussed by Rodrik (2007), overvaluation can be particularly harmful to non-traditional exports which may be subject to market imperfections in the form of information (learning, cost discovery) and coordination externalities. Preliminary evidence illustrated in Figure 11, which is based on the residuals of fixed effects regressions accounting for standard controls, seems to suggest that overvaluation can instantaneously lead to more export concentration and over time to countries' specialization away from 'rich-country products'. [13]

FIGURE 11 HERE

Our main empirical results focus on a panel dataset that spans the period 1993 to 2004. The choice of such a sample was determined in the time series dimension by the availability of the EXPY measure which only starts in 1992 and in the cross-section dimension by the misalignment measure which is available for 96 countries. Our methodology again employs the S-GMM estimator. The model that we estimate is:

$$(7)\quad E_{it} = \beta_0 + \beta_1 MIS_{it} + \beta_2 E_{it-1} + \beta_3 LnPop_{it} + \beta_4 LnGDPPC_{it} + \beta_5 LandPW_{it}$$

$$+ \beta_6 Landlock_i + \beta_7 Prim_i + \beta_8 Fuel_i + \mu_t + \eta_i + \varepsilon_{it}$$

where E is one of the three export-performance indicators; *MIS* is the real exchange rate misalignment; *LnPoP* is the log of population size; *LnGDPPC* is the log of real per capita GDP; *LandPW* is land as a share of the labor force; *Landlock, Prim,* and *Oil* are dummy variables which take the value of 1 if a country is landlocked, exports primary products other than fuel, or exports fuel products and takes the value of 0 otherwise; and μ, η, ε are time, country dummies and the error term.

The empirical results are presented in Table 5 and they confirm the negative role of RER overvaluation on export diversification and sophistication.[14] For all three dependent variables their past values are highly significant confirming that all three measures tend to demonstrate stability over time. The misalignment variable has the expected sign and is significant in all three regressions implying that a more overvalued exchange rate would damage the manufacturing base, lead to more export concentration, and would undermine the venture into more sophisticated

products. Other controls are also significant; landlocked countries have a higher HHI and lower EXPY values. The availability of primary resources (fuel or otherwise) is also detrimental to diversification (a dummy for fuel exporters is significant in the regression for manufacturing as a share of merchandise exports and for HHI, and a dummy for other primary exporters is significant in the regression for manufacturing as a share of merchandise exports and for EXPY).

TABLE 5 HERE

Imbs and Wacziarg (2003) found that poor countries tend to diversify their production structure but beyond a certain income threshold further growth is associated with product concentration. Our findings tell us that these countries choose to diversify their *export* structure (since we are only focusing on developing countries, all observations lie to the left of the inverted U curve of income and diversification measure).

Another important finding is that the ability of developing countries to diversify exports hinges on their capacity to avoid real exchange rate overvaluation. Figure 12 presents a scatter plot of the link between income per capita and EXPY (both in logs) for 2003, the most recent year for which we have data. The fitted line in the scatter plot describes the positive relationship between income and export sophistication for our sample of developing countries. The scatter plot also illustrates that there are many countries that are outliers to this described relationship, either through their ability to export more sophisticated products than their development level would predict or to export significantly below their predicted level.

FIGURE 12 HERE

China is one much-discussed country whose exports are much more sophisticated than its income level would predict. Although we do not have data from our own work, there has been much publicity to the fact that China's exchange rate has been strategically kept undervalued to make exports competitive abroad (see Rodrik, 2007). Other countries, for which we have data, seem to follow a similar pattern (India, Indonesia). On the contrary, Sudan' EXPY is much lower than its predicted value. Some of this shortfall may be explained by the fact that Sudan's RER was grossly overvalued in 2003 (the most recent year for which we have data) and has been overvalued for a long time, averaging 17% since 1998. On the up side, countries like India, Indonesia, and South Africa have achieved a level of export sophistication that is a lot higher than what their income level would predict, and this may be in part

explained by their ability to keep their real exchange rates undervalued at least for the period since 1998. For South Africa the concern would be that recent overvaluation could have undermined the gains achieved in terms of export diversification and sophistication and possibly harmed one of the most important channels for dynamic growth and poverty reduction.

Eichengreen (2007), however, argues that targeting certain sophisticated export activities by certain domestic policies, including those that promote RER undervaluation may merely play a role of a "facilitating" channel to permit the realization of certain favorable conditions. For example, he argues that to the extent that Chinese firms rely on their links to overseas Chinese or to China's proximity to Japan and Korea, RER undervaluation or other domestic policies may not be enough for other countries that do not possess such advantages. The implication of this analysis for certain SSA countries would be that while RER undervaluation and other standard fundamentals are necessary, increasing the sophistication of exports may require further creative approaches, such as engaging their diasporas.

VI. Conclusions

The real exchange rate has played a central role in the development strategy of most countries, in particular when their ability to foster rapid TFP-driven growth is limited. This paper develops RER misalignment series for a large panel of countries and studies the empirical link between RER misalignment and performance measures like economic growth and export diversification and sophistication while also exploring possible interaction effects between RER misalignment with foreign aid and financial development. This paper makes a number of important contributions. At the technical level this paper develops an objective criterion for calibrating the estimated equilibrium RER so that it satisfies the condition that the RER must on average be in equilibrium in the long-run. At the empirical level, though the evidence produced has wider applicability, we emphasize the implications for Africa, given its diversity of exchange rate regimes and its high dependence on foreign aid as well as its relatively underdeveloped financial sector.

This paper's first contribution is to build model-consistent RER misalignment series for a large panel of countries. The RER misalignment series are generated from error-correction estimations for the equilibrium RER,

based on structural determinants. The empirical results –based on a world sample of annual 1970-2004 data for 83 countries– show that long-run coefficients of all structural variables and short-run coefficients of some structural variables are significant and display expected signs according to theory. Higher long-term foreign aid and terms of trade are shown to contribute significantly to long-term RER appreciation. However, short-term changes in aid do not have significant effects on short-run RER behavior. We used the long-run regression results to compute RER misalignment series for each country and to decompose RER misalignment according to the contribution of deviations of fundamentals from their long-term trends and of short-term dynamics. Not surprisingly, short-term shocks explain most of the RER deviations from equilibrium. Aid deviations from trend contribute particularly little to misalignment.

The evidence analyzed in this paper suggests that those countries that have experienced some growth spurts, especially when associated with a measure of export diversification, were also likely to have been able to avoid disequilibrium real exchange rate overvaluation. In fact the evidence suggests an even stronger implication regarding exchange rate policy in that, not only overvaluation is bad for growth and export diversification, but that *undervaluation is good for both*. Therefore, the recent experiences of these countries should provide important lessons regarding the need to avoid high disequilibrium RER appreciation.

The additional empirical evidence that this paper offers is based on a growth equation that nests the above variables within a standard specification, controlling for growth fundamentals that are robustly identified in the empirical growth literature. Empirical estimations, based on the dynamic system GMM estimator, provide support for several channels of transmission from aid to growth. The linear positive effect of aid on growth supports the notion that recipient countries having access to foreign resources are likely to use aid to finance investment, improve policies, and raise aggregate efficiency. However, the negative non-linear effect also shows that aid has decreasing growth benefits, reflecting growing misuse and/or weakening absorptive capabilities of larger aid inflows. The paper has provided evidence against an indirect negative effect of aid on growth, via RER misalignment, showing that very little RER appreciation can be traced to exceptionally large aid inflows. Hence recent aid surges were not found to be a major contributor to Dutch Disease-type RER misalignment and lower growth. The preceding results are complemented by important interaction effects, which show that the negative growth impact of RER misalignment is

intensified by aid and weakened by financial development. Hence aid lowers growth in a macroeconomic environment that allows for RER overvaluation. Deeper financial markets provide better protection to (traded-goods) firms against periods of RER overvaluation, possibly by supplying more credit or offering hedging instruments against RER risk. Therefore, the empirical evidence on growth presented in this paper reveals important findings about the role of aid and other key growth determinants, both individually and through interactions.

Our results on the existence and determinants of moderate RER overvaluation for many countries experiencing aid surges and its negative impact on growth lead to recommend strengthening international competitiveness through appropriate macroeconomic policies. Avoiding excessive government spending has the benefit of raising growth, both directly and indirectly by reducing RER overvaluation. In the realm of structural policies, our results suggest that financial development and deepening – including banking and capital-market development – has a direct positive effect on long-term growth and an additional growth bonus by reducing the adverse growth impact of RER overvaluation. Hence financial development should be a high priority for these countries. This could include strengthening domestic banking, supporting development of domestic capital markets, and promoting development of financial instruments to protect against exchange-rate risk.

Finally, our empirical results also confirm the important negative role of RER overvaluation on export diversification and sophistication. These findings are based on a panel dataset that spans the period 1993 to 2004 and includes over 55 countries. Thus, developing countries' ability to diversify exports hinges on their ability to avoid real exchange rate overvaluation.

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Figure 1: Median RER evolution in developing countries

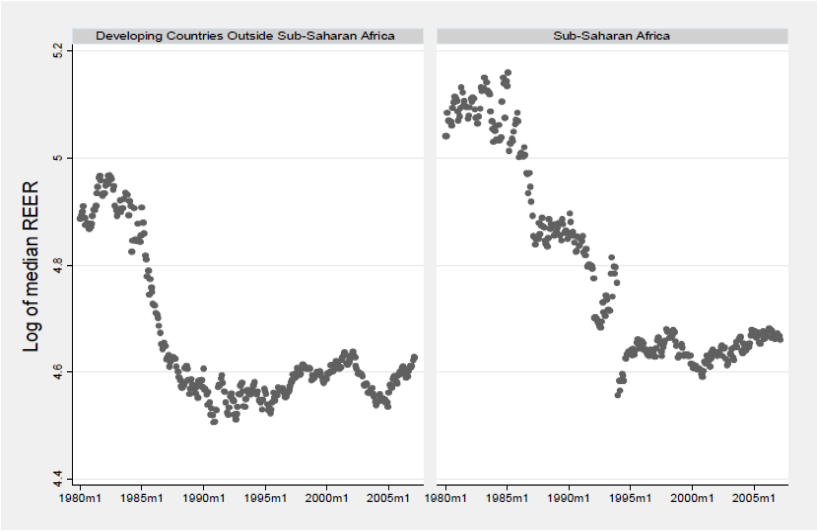


Figure 2: Median RER inside Sub-Saharan Africa by exchange rate regime

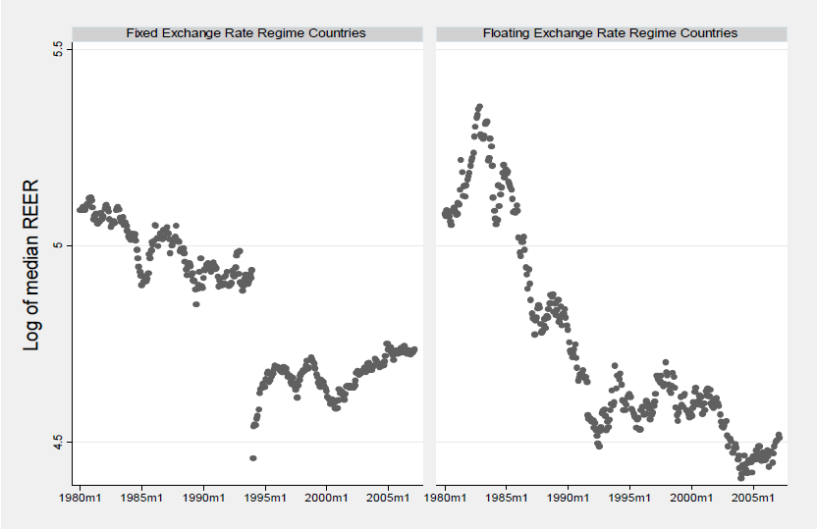


Figure 3: Median REER inside Africa by export type

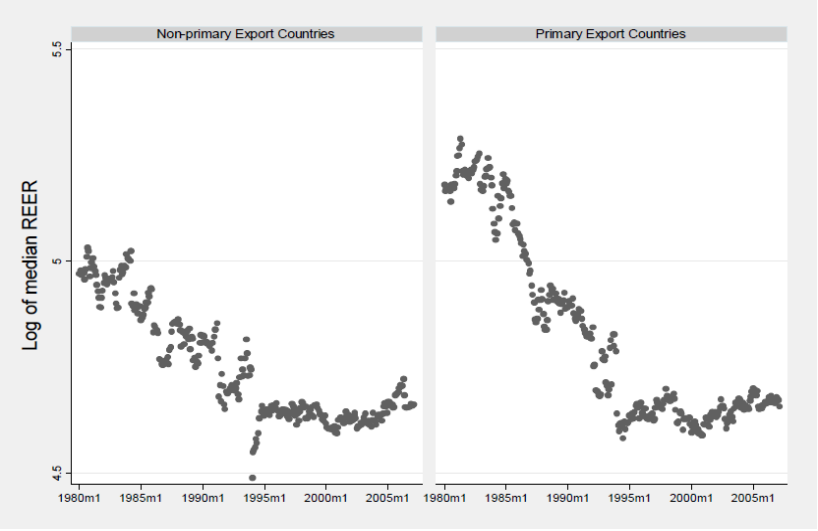


Figure 4: Importance of Manufacturing Exports in and outside Africa

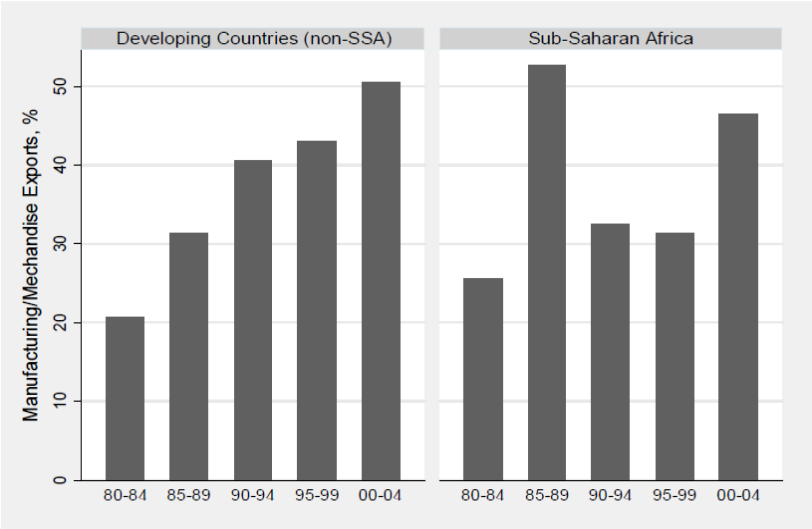


Figure 5: Economic Growth in and outside Africa

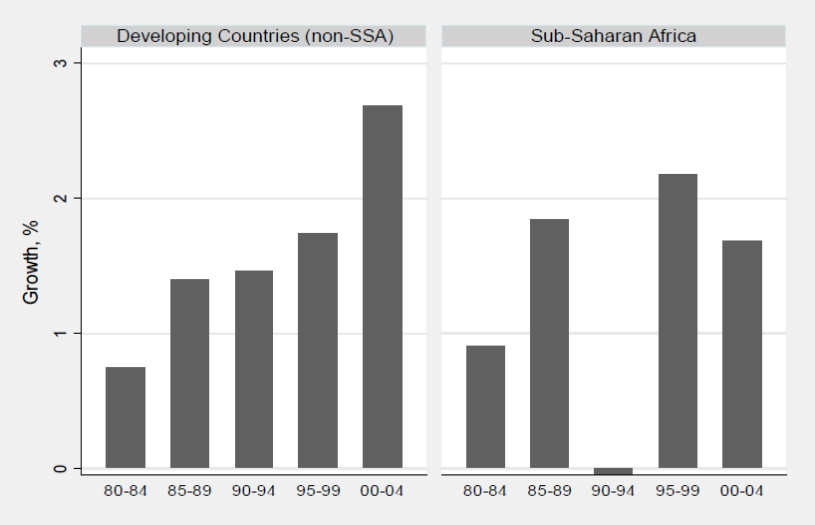


Figure 6: Foreign Aid in and outside Africa

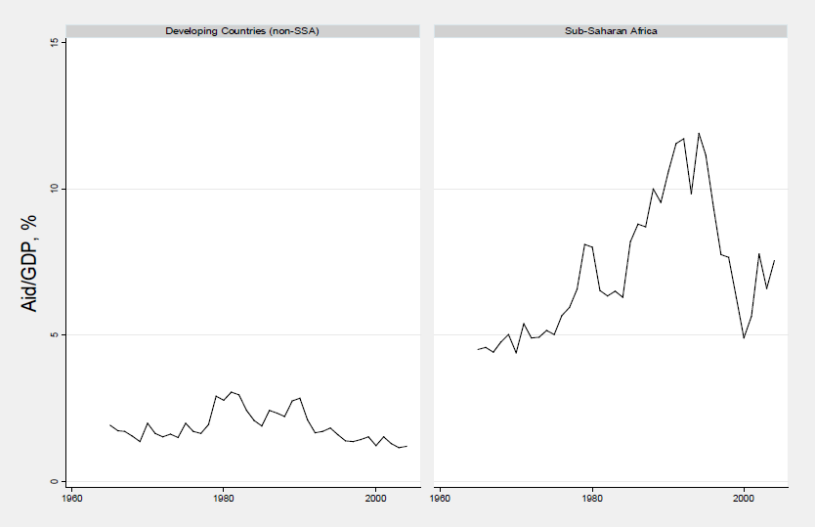
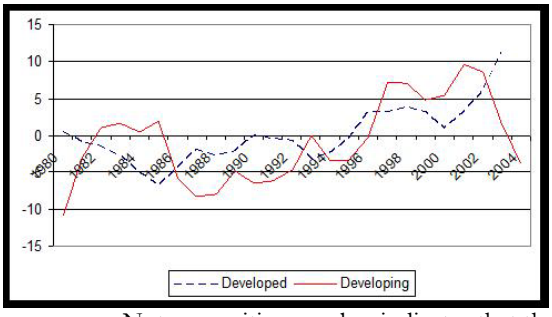
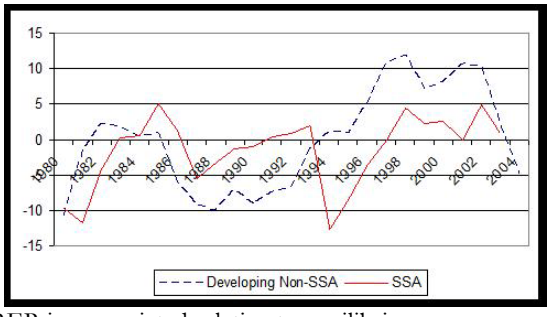


Figure 7: RER Misalignment in and outside Africa

Panel A



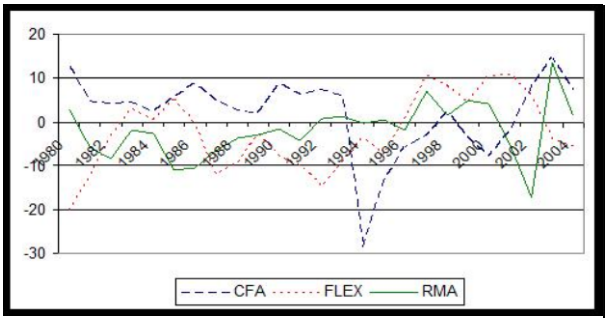
Panel B



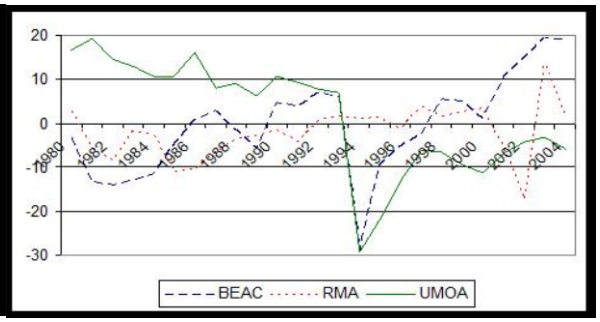
Note: a positive number indicates that the RER is appreciated relative to equilibrium.

Figure 8: RER Misalignment in Africa by exchange rate regime

Panel A

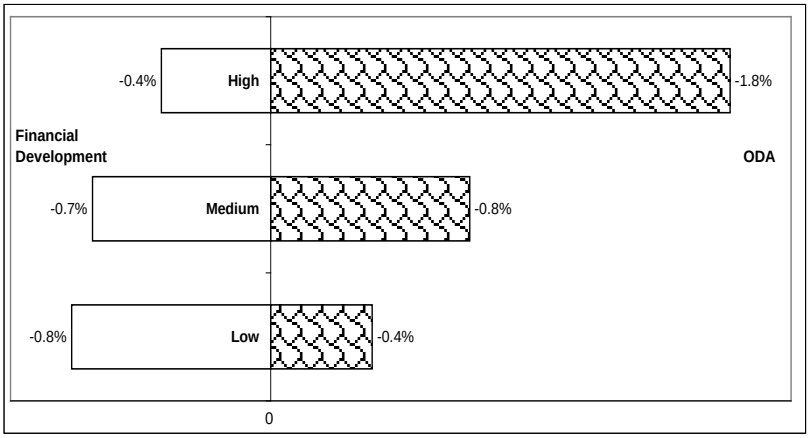


Panel B



Note: a positive number indicates that the RER is appreciated relative to equilibrium.

Figure 9: Impact of a one-standard-deviation change in RER misalignment on growth under various aid and financial development scenarios



Note: Simulations are based on the sample used for the growth regressions.

Figure 10: Various Measures of Export Diversification and Sophistication Across Regions, 2003

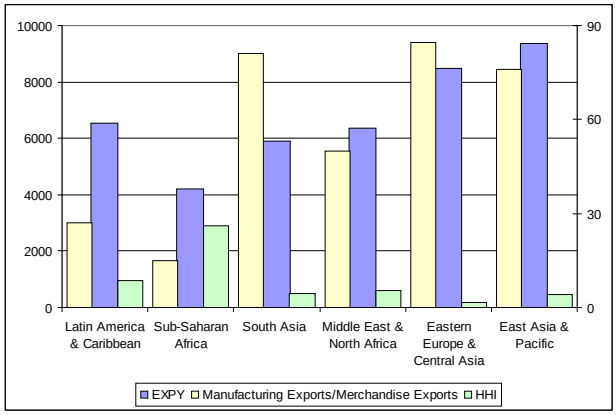


Figure 11: Misalignment and EXPY or HHI (after accounting for other controls)

a) b)

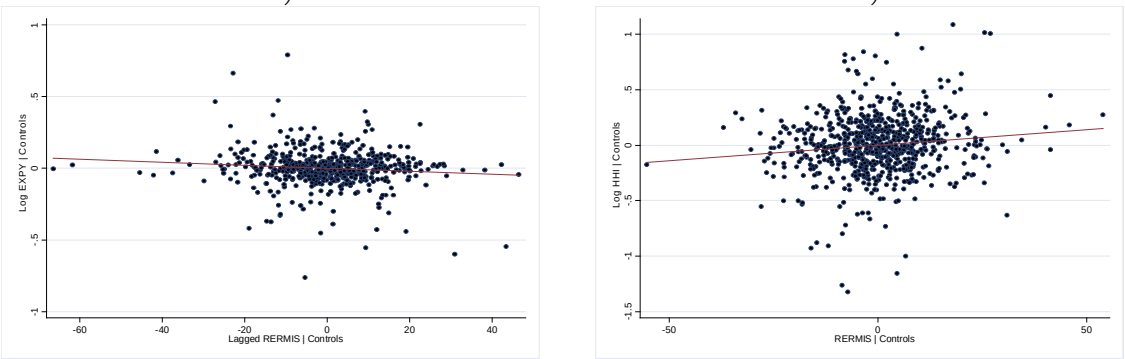


Figure 12: Income Per Capita, EXPY, and Real Exchange Rate Misalignment

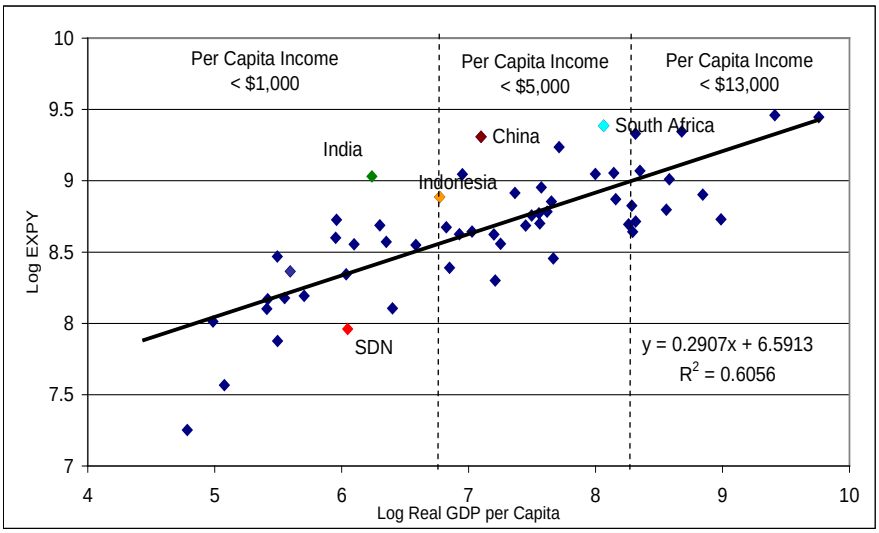


Table 1
The Long-and-Short-Run Determinants of the Real Exchange Rate
Estimator: Pooled mean group, Mean group, and Dynamic fixed effects (all controlling for country and time effects)
Dynamic Specification: ARDL(1,1,1,0,0,1,0,1)
Sample: annual data 1980-2004

	[1] [Pooled Mean Group]	[2] [Mean Group]	Hausman Tests	[3] [Dynamic Fixed Effect]
Long-Run Coefficients				
Terms of Trade	0.2082 ***	0.6880	0.7400	0.0783
(in logs)	0.031	1.038	0.390	0.055
Productivity	0.5184 ***	0.3150 ***	3.3000	0.5596 ***
(in logs)	0.017	0.113	0.070	0.040
Trade Openness	-0.5578 ***	-0.3370 *	1.3400	-0.4543 ***
	0.031	0.193	0.250	0.047
Government Consumption/GDP	2.6253 ***	-23.4960	1.2400	0.2271
(in logs)	0.258	23.438	0.270	0.399
Net Foreign Income/GDP	0.0037 **	0.0710	0.8700	0.0130 ***
	0.002	0.072	0.350	0.003
Foreign Aid Net of Int'l Reserve	0.0020 **	-0.0070	3.4100	0.0017
Accumulation/GDP	0.001	0.005	0.060	0.002
Taxes on Non-traded Goods	2.0308 ***	8.5500	0.8000	1.1015
(in logs)	0.403	7.317	0.370	0.730
Error Correction Coefficients	-0.2040 ***	-0.6990		-0.2509 ***
	0.022	0.041		0.013
Short-Run Coefficients				
D(Terms of Trade, logs)	0.0820 **	-0.0280		0.0093
	0.037	0.035		0.022
D(Productivity, logs)	0.4290 ***	0.1950 ***		0.3918 ***
	0.029	0.043		0.020
D(Net Foreign Income/GDP)	0.0040 **	0.0020		0.0014
	0.002	0.003		0.001
D(Taxes on Non-traded Goods, logs	0.4470	-0.4860		1.0929 ***
	0.470	0.489		0.317
Intercept	0.0210	0.0140		
	0.029	0.099		
No. Countries / No. Observations	83/1875	83/1875		83/1875

Numbers below coefficients are the corresponding standard errors with the exception of the Hausman test for which they are p-values. ***, **, and * stand for significance at the 1, 5, and 10 percent.

Source: Authors' calculations

Table 2: Net Effects of PMG Variables for Sub-Saharan Africa

	Coefficient	*Standard Deviation*	*Coefficient of Variation*	*Implied Net Effect*
Terms of Trade, logs	0.208	0.23	0.05	4.8%
Productivity	0.518	0.41	-0.11	21.2%
Filtered Openness	-0.558	0.23	-18.76	-12.6%
Government Consumption, ln(1+x)	2.625	0.03	0.22	7.9%
Net Foreign Income (% GDP)	0.004	3.14	-2.36	1.2%
Aid net of Int'l Reserves (% GDP)	0.002	6.70	0.57	1.3%
Taxes on Non-traded Goods, ln(1+x)	2.031	0.01	0.32	2.8%

*SSA values are based on the average of the standard deviations for the regression sample.

Table 3: Decomposition of RER Misalignment Across Exchange Rate Regimes

	Super Fixed Regimes						
Period	**RMA**	**UMOA**	**BEAC**	**SSA**	**Other SSA**	**Other Developing**	**OECD**
1985-1993							
RER Misalignment	-4.5	7.5	2.0	-1.1	-4.7	-8.5	-2.8
Fundamentals	-2.2	2.7	7.8	0.8	-0.8	-3.2	0.7
Error Correction	-2.2	4.8	-5.8	-1.9	-3.9	-5.3	-3.5
1994-1999							
RER Misalignment	4.1	-14.7	-4.0	-2.1	2.6	3.4	1.5
Fundamentals	3.7	-2.2	-10.4	-3.1	-2.0	2.5	0.0
Error Correction	0.4	-12.6	6.4	0.9	4.7	0.9	1.5
2000-2004							
RER Misalignment	5.3	-4.3	12.2	3.0	3.1	6.2	6.5
Fundamentals	-3.9	-0.9	3.5	1.6	2.7	1.8	-1.6
Error Correction	9.1	-3.5	8.7	1.4	1.4	4.4	8.0

Note: Values correspond to country and group averages.

Table 4
Economic Growth and the Role of RER Misalignment, Aid, and Financial Development
Cross-country panel data consisting of non-overlapping 5-year averages spanning 1970-2004
Dependent variable: Growth rate of real GDP per capita
Estimation method: GMM-IV system estimator

	[1]	[2]	[3]
Official Development Assistance/GDP	0.2005 **	0.1612 **	0.1771 **
(beginning of period)	0.0401	0.0358	0.0398
Official Development Assistance/GDP squared	-0.2488 **	-0.14767 **	-0.17559 **
(beginning of period)	0.0919	0.0765	0.0846
RER Misalignment	-0.0189 **	-0.0056	-0.0512 **
(% difference b/w log REER and its equilibrium)	0.0030	0.0037	0.0246
Financial Development	-0.0007 **	-0.0009 **	0.0008
(Liquid liabilities / GDP, in logs)	0.0003	0.0003	0.0012
Interactions			
RER*Official Development Assistance		-0.1956 **	-0.1540 **
		0.0532	0.0604
RER Misalignment*Financial Depth			0.0128 *
			0.0070
Standard Control Variables			
Initial GDP per Capita	-0.0095 **	-0.0110 **	-0.0111 **
(in logs)	0.0013	0.0013	0.0013
Initial GDP per Capita	-0.1408 **	-0.1474 **	-0.1436 **
Cyclical Component	0.0120	0.0127	0.0156
Inflation	-0.0053 **	-0.0056 **	-0.0061 **
(in logs)	0.0010	0.0008	0.0009
Government Expeditures/GDP	-0.0222 **	-0.0236 **	-0.0260 **
(in logs)	0.0039	0.0038	0.0045
Human Capital Investment	0.0298 **	0.0297 **	0.0295 **
(secondary enrollment, in logs)	0.0028	0.0031	0.0035
Rule of Law	0.0155 **	0.0169 **	0.0168 **
(from ICRG, 0-6)	0.0012	0.0014	0.0014
Trade Openess	0.0166 **	0.0182 **	0.0164 **
(trade volume/GDP, in logs)	0.0017	0.0018	0.0022
Period Shifts:			
Intercept (base period: 1975-79)	-0.1621 **	-0.1610 **	-0.1618 **
1980-84	-0.0146 **	-0.0156 **	-0.0160 **
1985-89	-0.0189 **	-0.0194 **	-0.0202 **
1990-94	-0.0248 **	-0.0257 **	-0.0261 **
1995-99	-0.0333 **	-0.0361 **	-0.0369 **
2000-04	-0.0304 **	-0.0324 **	-0.0335 **
No. Countries / No. Observations	77/357	77/357	77/357
SPECIFICATION TESTS (P-Values)			
(a) Sargan Test	0.68	0.68	0.68
(b) Serial Correlation :	0.01	0.01	0.01
Second-Order	0.39	0.34	0.35

Numbers below coefficients are the corresponding robust standard errors. * (**) denotes statristical significance at the 10 (5) percent level.
Source: Authors' calculations

Table 5
Export Diversification and Real Exchange Rate Misalignment
Cross-country panel data 1993-2004
Estimation method: GMM-IV system estimator

	Dependent Variable:		
	Manufacturing Exports/Merchandise Exports	Log of Herfindahl-Hirschman Index of Export Concentration	Log of EXPY
RER Misalignment	-0.0297 **	0.0013 **	-0.0007 **
(% difference b/w log REER and its equilibrium)	0.0034	0.0005	0.0003
Standard Control Variables			
Lagged Dependent Variable	0.9465 **	0.7443 **	0.7636 **
	0.0041	0.0304	0.0317
Population	0.2227 **	-0.0823 **	0.0227 **
(in logs)	0.0547	0.0118	0.0047
Real GDP per Capita	0.6782 **	-0.1354 **	0.0577 **
(in logs)	0.1343	0.0232	0.0121
Land per Worker	-0.5469	-0.0219	0.0114
	0.9044	0.1681	0.0516
Landlock	0.1875	0.0717 **	-0.0439 **
	0.2103	0.0348	0.0133
Dummy for Exporters of Primary Products (not fuel)	-0.4297 *	0.0113	-0.0626 **
	0.2359	0.0371	0.0162
Dummy for Exporters of Fuel	-2.0313 **	0.4502 **	-0.0230
	0.2879	0.0751	0.0148
Year Shifts	Y	Y	Y
No. Countries / No. Observations	66/551	62/670	55/385
SPECIFICATION TESTS (P-Values)			
(a) Sargan Test	na	0.97	0.98
(b) Serial Correlation :	0.00	0.00	0.03
Second-Order	0.72	0.27	0.14

Numbers below coefficients are the corresponding robust standard errors. * (**) denotes statristical significance at the 10 (5) percent level.
Source: Authors' calculations

Appendix A: Definitions and Sources of Variables Used in Regression Analyses

Variable	Definition and Construction	Source
ERER Regressions		
Real Effective Exchange Rate	An increase in the index reflects an appreciation. In logs.	IMF's Information Notice System, 2006
Government Consumption Expenditures/GDP	Ln(1+government consumption/GDP)	Authors' construction using International Financial Statistics, December 2004 CD-ROM Release, World Development Indicators, various years, and Africa Live Database (World Bank), various years
Taxes on Non-traded Goods	Ln(1+taxes on non-traded goods/GDP)	World Development Indicators, Africa Live Database, and Government Finance Statistics, various years
Official Development Assistance Net of International Reserves	As a share of GDP	World Development Indicators, 2006
Terms of Trade	In logs	World Development Indicators, 2004 and 2005 and Loayza et al. (2005)
Productivity	Ratio of per capita GDP at factor cost in United States dollars over average GDP at factor cost in United States dollars for Industrial Countries.	Authors' construction using World Development Indicators, 2005
Openness	Residual of a regression of the log of the ratio of exports and imports (in current local currency units) to GDP (in local currency units), on the logs of area and population, and dummies for oil exporting and for landlocked countries	World Development Indicators, 2004 and Loayza et al. (2005)
Net Foreign Income	As a share of GDP	World Development Indicators, 2006
Economic Growth Regressions		
GDP per capita growth	Log difference of real GDP per capita.	Authors' construction using data from World Development Indicators (WDI), The World Bank (2006).
Initial GDP per capita	Initial value of ratio of total real GDP to total population, in logs	Authors' construction using World Development Indicators, 2006
Initial GDP per Capita Cyclical Component	Difference between the lof of actual GDP per capita and the log of potential (trend) GDP; we ised the Hodrik-Prescott filter to decompose the log of GDP	Authors' calculations using data from WDI (2006)
Inflation	Percentage change in CPI, in logs	Author's calculations with data from WDI (2006)
Government Expenditures	Ratio of government expenditures (in local currency) to GDP (in local currency), in logs	Data come primarily from International Financial Statistics (IFS), 2006; when missing, they are complemented with data from WDI (2006) and UN National Accounts Statistics (2006)
Human Capital Investment	Ratio of total secondary enrollment, regardless of age, to the population of the age group that officially corresponds to that level of education, in logs	Easterly and Sewadeh (2002), WDI (2006), UNESCO (2006).
Rule of Law	Presence of law and order. Range is between 0 and 6.	International Country Risk Guide (ICRG), Political Risk Services. www.icrgonline.com
Trade Openness	Ratio of exports and imports (in local currency) to GDP (in local currency), in logs	Data come primarily from International Financial Statistics (IFS), 2006; when missing, they are complemented with data from WDI (2006) and UN National Accounts Statistics (2006)
Official Development Assistance	Percentage of GDP	WDI (2006)
RER Misalignment	Percentage difference between real effective exchange rate and its estimated equilbrium value.	Authors' calculations. See Appendix A.1 for the methodology.

Appendix A: Definitions and Sources of Variables Used in Regression Analyses (Cont.)

Variable	Definition and Construction	Source
Financial Depth	Ratio of liquid liabilities to GDP, in logs. Liquid liabilities are also known as broad money or M3.	WDI (2006)
Period-specific Shifts	Time dummy variables.	Authors' construction.
Export Regressions		
Manufacturing Exports	% of Merchandise Exports	World Development Indicators, 2006
Hirfindahl-Hirschman Index	Concentration index based on SITC2-4 data from COMTRADE, in logs	Chandra et al (2007)
EXPY	GDP per capita of countries exporting a particular good weighted by the value of exports summed over a country's export basket, in logs	Hausmann et al (2006)
RER Misalignment	Difference between the log of effective real exchange rate and log of estimated equilibrium real exchange rate	Authors' construction
GDP per Capita	Real GDP/Populations, in logs	World Development Indicators, 2006
Population	In logs	
Land per Worker	Land/Labor Force	Global Development Network and World Development Indicators, 2006
Landlockedness	Dummy variable taking the value of 1 if a country is landlocked and 0 otherwise	Global Development Network
Exporter of Primary Products (not fuel)	Dummy variable taking the value of 1 if a country is an exporter of primary (non-fuel) products and 0 otherwise	Global Development Network
Exporter of Fuel Products	Dummy variable taking the value of 1 if a country is an exporter of fuel products and 0 otherwise	Global Development Network
Year-specific Shifts	Time dummy variables.	Authors' construction.

Appendix B: Country and Sample Coverage

	Equilibrium RER Regression	Growth Regressions	Exports Regressions with Dependent Variable:		
			Manufacturing/ Merchandise Exports	HHI	EXPY
Algeria	√	√	√		√
Argentina	√	√	√	√	√
Australia	√	√			
Austria	√	√			
Bangladesh	√	√	√	√	√
Belgium	√				
Benin			√	√	√
Bolivia	√	√	√	√	√
Botswana	√	√			
Brazil	√	√	√	√	√
Burkina Faso	√	√	√	√	√
Burundi	√		√	√	√
Cameroon	√	√	√	√	
Canada	√	√			
Central African Republic	√		√	√	√
Chad	√			√	
Chile	√	√	√	√	√
Colombia	√	√	√	√	√
Costa Rica	√	√	√	√	√
Cote d'Ivoire	√	√	√	√	√
Democratic Republic of the Congo		√			
Republic of the Congo		√	√	√	
Denmark	√	√			
Dominican Republic	√	√	√	√	
Ecuador	√	√	√	√	√
Egypt	√	√	√		√
El Salvador	√	√	√	√	√
Ethiopia	√	√	√	√	√
Finland	√	√			
France	√	√			
Gabon	√	√	√	√	√
Gambia	√	√	√		√
Germany	√				
Ghana	√	√	√	√	√
Greece	√				
Guatemala	√	√	√	√	√
Guinea Bissau		√			
Honduras	√	√	√	√	√
India	√	√	√	√	
Indonesia	√	√	√	√	√
Ireland	√	√			
Israel	√	√	√	√	√
Italy	√	√			
Jamaica	√	√	√	√	√
Japan		√			
Jordan	√	√	√	√	√
Kenya	√	√	√	√	√
Korea	√	√	√	√	√
Lesotho	√			√	√
Madagascar	√	√	√	√	√

Appendix B: Country and Sample Coverage (Cont.)

Malaysia	√	√	√	√	√
Malawi	√	√	√	√	√
Mali	√	√	√	√	√
Mauritania	√			√	
Mauritius	√		√		√
Mexico	√	√	√	√	√
Morocco	√	√	√	√	√
Mozambique	√	√	√	√	
Netherlands	√				
New Zealand	√	√			
Niger	√	√	√	√	√
Nigeria		√	√	√	√
Norway	√	√			
Pakistan	√	√	√	√	
Panama	√	√	√	√	√
Papua New Guinea	√	√	√		
Paraguay	√	√	√	√	√
Peru	√	√	√	√	√
Philippines	√	√	√	√	√
Portugal	√				
Rwanda	√		√	√	√
Senegal	√	√	√	√	√
Sierra Leone	√	√	√	√	
South Africa			√	√	
Spain	√	√			
Sri Lanka	√		√	√	√
Sudan	√	√	√	√	√
Swaziland	√		√		
Sweden		√			
Switzerland	√	√			
Syria		√			
Tanzania		√	√	√	√
Thailand	√	√	√	√	√
Togo	√	√	√	√	√
Trinidad & Tobago	√	√	√	√	√
Tunisia	√	√	√		
Turkey	√	√	√	√	√
Uganda	√	√	√	√	√
United States	√	√			
Uruguay	√	√	√	√	√
Venezuela	√	√	√	√	√
Zambia	√	√	√	√	√
Zimbabwe	√	√	√	√	

Note:

A check mark indicates that the country was included in the regression estimation specified as the column heading under which the check mark is placed.

For those cases when a country does not get a check mark for the equilibrium RER estimation but is included in the growth or export regressions, this implies that its RER misalignment series was obtained by applying the out of sample coefficients. Coefficients.

Appendix C: Computing the Equilibrium Real Exchange Rate and RER Misalignment Indexes

In order to determine the equilibrium RER it is useful to collapse all of its determinants into a category we call *fundamentals*. Let e_{it} be the log of the observed real exchange rate for country *i* in time *t*. Then we can write the equilibrium RER equation as:

$$e_t^i = \hat{\delta}_0^i + \hat{\beta}' F_t^i + \hat{\varepsilon}_t^i \quad (1)$$

Where, *i* denotes a country and ε_t^i is a stochastic innovation or short-term fluctuation. Note that the intercept varies across countries. Let the equilibrium RER be as follows:

$$\tilde{e}_t^i = \tilde{\delta}_o^i + \hat{\beta}' \tilde{F}_t^i \quad (2)$$

where $\tilde{F}_t^i$ refers to sustainable fundamentals, given by the permanent components of the fundamentals and $\tilde{\delta}_0^i$ is a scaled country-specific intercept to be identified below.

Under the assumption that the model is correctly specified, the real exchange rate misalignment (MIS) is simply given by subtracting the equilibrium from the observed RER:

$$MIS_{it} = e_t^i - \tilde{e}_t^i = (\hat{\delta}_0^i - \tilde{\delta}_0^i) + \hat{\beta}'(F_t^i - \tilde{F}_t^i) + \hat{\varepsilon}_t^i \quad (3)$$

The scaled intercept of the equilibrium RER ($\tilde{\delta}_0^i$) must satisfy the following identification condition:

$$E_t(MIS_{it}) = E_t\left[(\hat{\delta}_0^i - \tilde{\delta}_0^i) + \hat{\beta}'(F_t^i - \tilde{F}_t^i) + \hat{\varepsilon}_t^i\right] = 0 \quad (4)$$

This condition requires that, for any given country, the expected value of the misalignment across time must be equal to zero. This is because eventually the RER must revert to it equilibrium level; otherwise it will not be "misalignment" but a permanent phenomenon. Though the expected value of the transitory components of the fundamentals (second right hand side term) should be zero, we do not make that restriction to allow for potential misspecification of the decomposition procedure[1].

Noting that the first right hand side term is time-invariant, we have the following sample estimate for the equilibrium intercept term:

$$\tilde{\delta}_0^i = \hat{\delta}_0^i + \hat{\beta}'[\frac{1}{n}\sum_t (F_t^i - \tilde{F}_t^i)] + \bar{\hat{\varepsilon}}_t^i \quad (5)$$

Note that though the panel estimation requires that $E_{t,i}\left[\hat{\varepsilon}_t^i\right] = 0$, $E_t\left[\hat{\varepsilon}_t^i\right]$ is not, in general, equal to zero and can be estimated by the mean of the residuals $\bar{\hat{\varepsilon}}^i = \frac{1}{n}\sum_t \hat{\varepsilon}_t^i = \frac{1}{n}\sum_t e_t^i - \hat{\delta}_0^i - \hat{\beta}'(\frac{1}{n}\sum_t F_t^i)$ (from equation 1). Substituting for the mean residual in equation (5), we have the final expression for the equilibrium intercept:

[1] We show below that the expression for the equilibrium RER is the same whether or not we assume the expected values of the transitory fundamentals to be zero. Moreover, under the general case, the equation for misalignment generates the one with the expected value equal to zero as a special case.

$$\tilde{\delta}_0^i = \bar{e}^i + \hat{\beta}'(\bar{F}^i - \bar{\tilde{F}}^i) - \hat{\beta}'\bar{F}^i = \bar{e}^i - \hat{\beta}'\bar{\tilde{F}}^i, \quad (6)$$

where, $\bar{e}^i, \bar{F}^i$ *and* $\bar{\tilde{F}}^i$, respectively, denote the mean values (over time) of the actual RER, the fundamentals, and their corresponding permanent components.

Using equations (6) and (2) gives us the ultimate expression for the equilibrium RER index:

$$\tilde{e}_t^i = \bar{e}^i + \hat{\beta}'(\tilde{F}_t^i - \bar{\tilde{F}}^i) \quad (7)$$

This expression states that, for any given country *i*, the RER equilibrium index must be equal to the average of the observed RER over the estimation period plus (minus) a component reflecting equilibrium appreciation (depreciation), where an equilibrium appreciation (depreciation) is required when the weighted permanent component of the fundamentals in time t is larger (smaller) than the corresponding average over the estimation period (second right hand side term).

Subtracting the above index from the observed RER gives the corresponding expression for misalignment[2]:

$$MIS_t^i = (e_t^i - \bar{e}^i) - \hat{\beta}'(\tilde{F}_t^i - \bar{\tilde{F}}^i) \quad (8)$$

Like the equilibrium RER index, the expression for misalignment is also very intuitive. It suggests that, at any point in time, if the difference between the RER at time *t* and the average RER is in excess of the equilibrium appreciation component the exchange rate is overvalued at time *t*, and the extent of the overvaluation is given by the net difference. This expression also suggests that depending on the size of the equilibrium appreciation component, a higher than average real exchange rate is compatible with overvaluation (*MIS*>0), undervaluation (MIS<0) or equilibrium (*MIS*=0).

If the permanent components of the fundamentals are time-invariant, the second term in the RHS of equations 7 and 8 will be zero. The equilibrium RER will, therefore, be equal to the mean of the observed RER and the misalignment will be given by the deviation from the mean RER. This will be consistent with a variant of the PPP model. However, the PPP restriction is neither corroborated by theory nor the time series characteristics of the fundamentals, especially for the case of developing countries.

Decomposing RER Misalignment

Equation (8) is all what we need for constructing the equilibrium RER index and the corresponding aggregate index of RER misalignment. However, further manipulation of this equation would provide further insight for policy analysis. Using equation (1) to substitute for the first RHS term of equation 8 we have[3]:

---

[2] Under the assumption that $E_t\left[\hat{\beta}'\left(F_t^i - \tilde{F}_t^i\right)\right] = 0$, the corresponding expression for the equilibrium intercept is given by $\tilde{\delta}_0^i = \bar{e}^i - \hat{\beta}'\bar{F}^i$. However, since $\bar{F}^i = \bar{\tilde{F}}^i + \frac{1}{n}\sum(F_t^i - \tilde{F}_t^i)$ and the second RHS term is equal to zero by assumption/construction, the expression for the intercept is the same under both cases. Therefore, the expressions for the equilibrium RER (equation 7) as well as misalignment (equation 8) also remain the same.

[3] Note that if $\frac{1}{n}\sum_t F_{it}^T = 0$ the expression for *misalignment* becomes a special case of equation 9.

$$MIS_t^i = \hat{\beta}'[(F_t^i - \tilde{F}_t^i) - (\bar{F}^i - \bar{\tilde{F}}^i)] + (\hat{\varepsilon}_t^i - \bar{\hat{\varepsilon}}^i) = \hat{\beta}'(F_t^{T\,i} - \frac{1}{n}\sum_t F_t^{T\,i}) + (\hat{\varepsilon}_t^i - \bar{\hat{\varepsilon}}^i) \qquad (9)$$

Where, a "T" over a variable indicates its "transitory" component. This expression suggests that RER misalignment can be accounted for by a fundamental component and an error-correction component. For example, the RER will be overvalued in time t if the "weighted" transitory component of the fundamentals is larger than the average and that deeper than average error-correction is required. The latter reflects the effect of short-run macroeconomic policies, which are not part of the long-run fundamentals but may influence the RER in the short-run (e.g. rate of monetary expansion, nominal devaluation).

ENDNOTES

[1] Ndulu et al. (2007) provide the most recent comprehensive analysis of such challenges. Easterly and Levine (1997) and Artadi and Sala-i-Martin (2003) discuss the African growth experience.

[2] See, for example, Burnside and Dollar (2000) and Collier and Dollar (2002).

[3] See, for example, Ghura and Grennes (1993) and Elbadawi (2002).

[4] These countries belong to the CFA zone whose currency was pegged to the French Franc and now to the Euro (Burkina Faso, Central African Republic, Cote d'Ivoire, Cameroon, Republic of Congo, Gabon, Guinea-Bissau, Mali, Niger, Senegal, Chad, Togo) and countries belonging to the Rand Monetary Area (Lesotho, Swaziland, and Namibia).

[5] Elbadawi and Soto (1997) and Baffes et al. (1999) provide ample evidence.

[6] Edwards (1989) and Elbadawi (1994) provide pioneering analysis of theoretical and empirical equilibrium RER models, respectively.

[7] See appendix A for data definitions and sources and appendix B for the country list.

[8] Comparable findings in the literature include Chinn (1997) for productivity; Elbadawi and Soto (1997) and Drine and Rault (2004) for terms of trade; Maeso-Fernandez et al. (2002) for government consumption; and Elbadawi and Soto (2008) for the other variables.

[9] Unlike the UMOA, the average overvaluation in BEAC was much smaller (at 2%) and was moderated by the error-correction effect.

[10] We test whether the differenced error term (the residual of the regression in differences) is second-order serially correlated, which would indicate that the original error term is serially correlated and follows a moving average process of at least order one. This would reject the appropriateness of the proposed instruments (and would call for higher-order lags to be used as instruments).

[11] The only exception is financial development in the first two regressions where it has an unexpected, small negative effect on growth. We focus on column 3 which we regard as the correctly specified model.

[12] See Imbs and Wacziarg (2003) for a world sample and Sekkat and Varoudakis (1998) for SSA.

[13] We also ran a similar regression for manufacturing as a share of merchandise exports, but none of the misalignment variables were significant. However, this result changes later on when we address endogeneity.

[14] In one case the Sargan test statistic cannot be computed given the near singularity of variance-covariance of the moment conditions. This arises when the cross-sectional dimension is small relative to the number of instruments. In such case we rely only on the residual autocorrelation test.